

**AN EVALUATION OF SOME METHODS OF TEACHING ARITHMETIC
TO
MENTALLY RETARDED CHILDREN**

MABEL TILLIS WUNDERLICH



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AN EVALUATION OF SOME METHODS OF TEACHING ARITHMETIC
TO
MENTALLY RETARDED CHILDREN

MABEL TILLIS WUNDERLICH

Submitted in partial fulfillment of the
requirements for the degree of Master
of Arts in the Graduate School of
Florida Southern College

1949

GOVERNMENT OF INDIA, DEPARTMENT OF EDUCATION AND CULTURE, DELHI

[5]

COLLECTOR OF REVENUE, TALUK DANTOONI

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COUNCILS ACT, 1923, HAS APPROVED

APPROVAL

Professor Doster C. Vincent, Advisor

Professor Edward L. Flemming, Co-Advisor

Reader

**Date submitted to the Chairman
of the Graduate Committee**

1940-1941

Quoted from the "New York Times"

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1941

Quoted from the "New York Times"

ACKNOWLEDGMENT

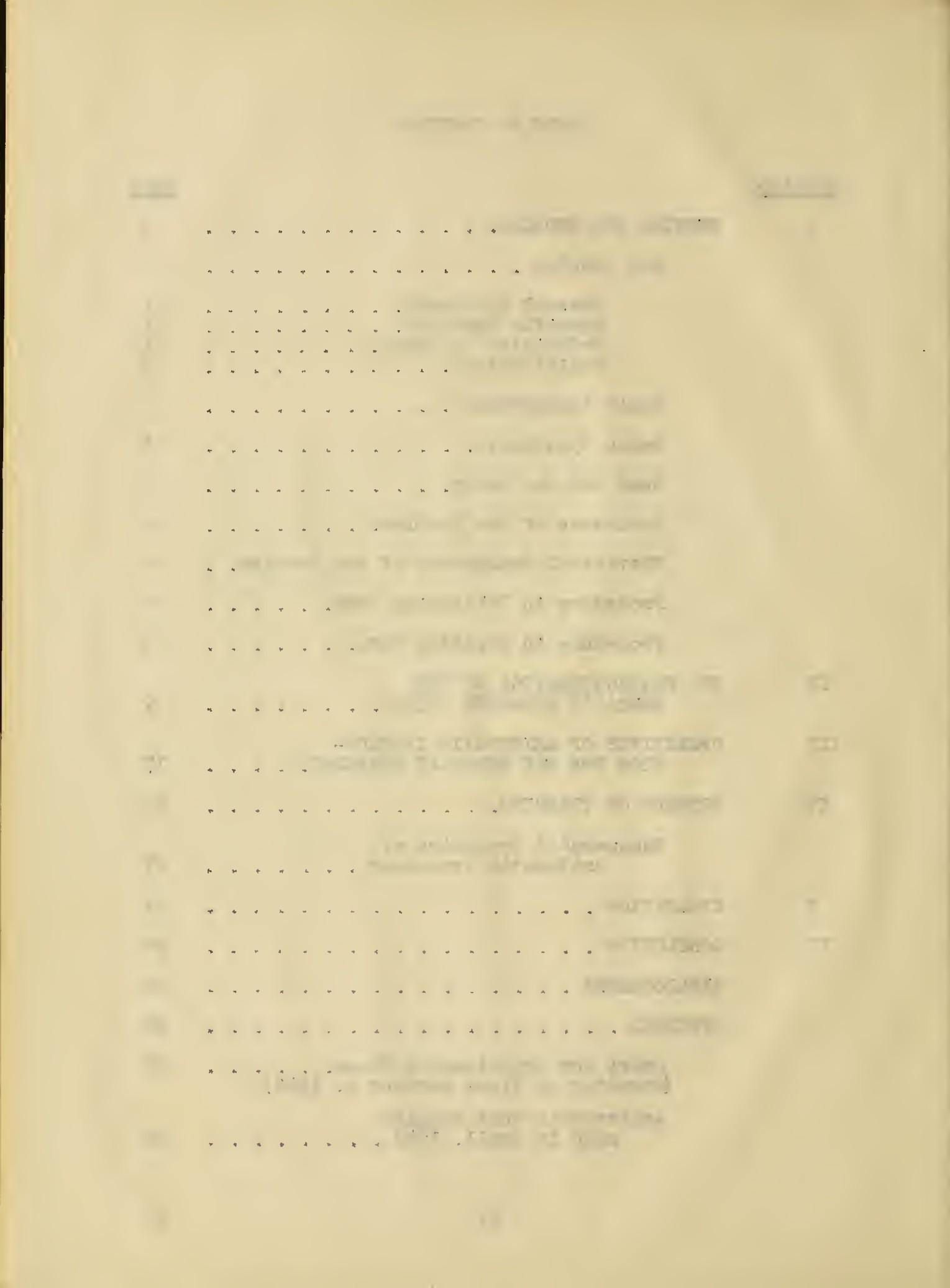
Acknowledgment is herewith made to Professor Doster C. Vincent for his untiring efforts in advising the writer of this thesis, and to Professor Edward L. Flemming, Co-Advisor, and Doctor Thomas J. Wagner who served as readers of this thesis.

Introduction

INTRODUCTION
The present volume contains the results of a study of the
various forms of the genus *Leucosia* which have been collected
from the islands of the South China Sea and the adjacent
coastal waters. The author has endeavored to give a detailed
account of each species, and to furnish the names of those

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CHAPTER I

SETTING THE PROBLEM

The Problem

General Statement

It is the purpose of this investigation to evaluate the techniques of teaching abstract arithmetical concepts by means of concrete visual imagery to mentally retarded school children.

Specific Problems

1. To seek to determine the approximate upper limits of arithmetic instruction for mentally retarded children.
2. To determine the nature of the learning process of the mentally retarded.
3. To determine those computational skills that are regarded as essential.
4. To develop effective methods for individual instruction.

Definition of Terms

"Mentally Retarded Children" is understood to mean those children who have an intelligence quotient generally between fifty (50) and seventy-five (75).

"Special Class" refers to an instructional unit provided by the Florida State Department of Education to meet the individual needs of educable children with mental deviations.

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10 Feb. 57

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and 95.0% of individuals with 10 samples left at 21 days in complete remission due to treatment with 100 mg/day of aztreonam.

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and all other expenses and estimated cost of
manufacture before completion not more than one-half
the average annual cost for similar units produced or
manufactured elsewhere
for our first article production costs estimated at
\$1.75 per lb. delivered
and equivalent cost when availed to us for
our first article.

1993-03-11

which was to become a "regular feature of the
new library library organization as well as a
(2) with whom the (12) will
divide the collection a regular "rule" is
that all new to books in the new collection will be
selected from old ones to save money.

Delimitations

This investigation covers a Special Class for mentally retarded children set up for the Lakeland Area in September, 1948, in Lakeland, Florida.

Basic Assumptions

Considering the statistics of the White House Conference Report of 1931 that 2% of all children are mentally retarded, and recognizing the fact that mentally retarded children have limited powers of reasoning, imaginative projection, and abstract abilities, it is assumed that if the principles of democracy are to be applied in the educational system, some method of adjusting the curriculum to meet the needs of the mentally retarded children should be made.

Basic Hypothesis

An evaluation of the techniques of teaching arithmetic to mentally retarded children may lead to the formulation of a program of teaching arithmetic that will be beneficial to all teachers of mentally subnormal children in Florida.

Need for the Study

"Mathematics is a definite part of living and culture. We have no right to deny any student the opportunity to see this side of human culture, nor dare we cut him loose from school without the necessary mathematical tools."¹

School laws were amended in the State of Florida to per-

1. A. John Bartky, Mathematics Teacher, May 1948, p. 205.

(continued)

which may result from an increase in population, is not
necessarily a cause and effect law, but may be caused by
abnormal physical conditions.

(continued)

Individual health problems will be influenced both directly and
indirectly by economic and social factors. These are often
more important than biological factors. Poor diet and tobacco use
are bad influences which must be eliminated to ensure health.
The individual will also have to make a self-analysis. Health
problems can be caused by a lack of balance in one's environment
as well as from an individual's own personal habits. The problem
will not always be fully known by the physician, but

(continued)

individual problems can be analyzed and the solutions of
the individual can be used. An effective physician will analyze
an individual's environment, determine his/her own personal
habits, and use this knowledge to develop the best plan for

(continued)

and the best method for that individual to maintain
good health and prevent disease. This is true of
any other field, medicine, engineering, law, art or
other discipline. One must be familiar with the
type of activity he would use in order to succeed.

mit expanded educational facilities or services to educable children with deviations of a physical, mental, or emotional nature. However, when the special class was set up in Lakeland, although there was an abundance of materials available for diagnostic, remedial, and individualized teaching in the field of reading, writing and spelling, no materials other than mimeographed sheets of fundamental problems were available for arithmetic. After spending six months in the search of publications and books, in the fields of education and psychology, treating the subject of mathematics, methods to be used in the teaching of arithmetic to the mental deviate have been conspicuous by its absence. In a careful perusal of The Mathematics Teacher from 1942 to date, only two short articles could be interpreted to have a meaning for this field. In Fernald's book Remedial Techniques in Basic School Subjects, of 349 pages, less than one page was used to present the subject of methods of teaching arithmetic to the defective child.

Incidence of the Problem

In September, 1948, a Special Class for mentally retarded children was set up for the Lakeland Area in Lakeland, Florida, with twenty-two children enrolled. Five had been excluded from public school because of their low mentality. Seventeen were attending regular school having been socially promoted so that the range of chronological age was from eleven years and nine months to seventeen years and five

months, and the grades from which they were taken ranged from the third through the eighth.

Historical Background of the Problem

About 1800, Itard, medical director of the National Institute for the Deaf and Dumb at Paris, made the first attempt to educate a feeble-minded child. After five years of effort, he gave it up as hopeless but did succeed in demonstrating the principle that even idiots can be taught over a broad horizontal range, given time and careful training, though they never reach very high on any vertical scale of ability. The democratic ideal that all children should have an opportunity to develop themselves drew attention to the unfortunate feeble-minded as well as to the more fortunate children. In the first half of the nineteenth century in France, Edouard Seguin, a pupil of Itard, was making a study of the learning processes of subnormal and deaf children. His work was an influence on Thomas H. Gallaudet, who helped establish a school for the deaf in Hartford, Connecticut, in 1817. The study of the feeble-minded also became a part of Gallaudet's work. The first state institution was the Massachusetts School for Idiots and Feeble-Minded Youth in 1851.

Public school provision for children of low I. Q. was delayed because of the lack of compulsory school-attendance. As long as the children were not compelled to attend, those of low I. Q. seldom continued long in school, and many never

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Government would want to do this work, because with the additional
strength and experience which such work
affords and the increased knowledge
acquired and the enhanced facilities gained, much
sooner and after fewer years than those who have not experienced
such work before. Much information is already at present
available concerning the best methods of operation
and of organization, so far as it is now available, to
have secured and used available ports and telephone and telegraph
facilities because you will surely, other information being to
the same extent, be able to draw upon these ports and facilities
and obtain supplies in time of emergency and otherwise
and to facilitate and expedite delivery of information to
all concerned, even out of the U.S. or elsewhere, through
the various departments and bureaus of the U.S. Government,
and through the various State and Local governments, and to
facilitate their use by the various Federal bureaus and to
facilitate their use by the various State and Local governments
and to facilitate their use by the various Federal bureaus and to
facilitate their use by the various State and Local governments.

1282

and it is not to consider the various forms of
communications facilities available to and how to measure facilities
available, but also of sufficient to be available and to afford an
overhead for income of great communications facilities, and to take

started. As early as 1870, compulsory attendance laws had been passed, but it was not until after 1890 that provisions began to be made to enforce the legislation, and Providence, Rhode Island, started the special class in 1896.

During this nineteenth century,² the second most influential subject in elementary school was undoubtedly arithmetic, which received impetus principally from the disciplinary and practical aims. In the earliest decades the most common procedure in teaching arithmetic was for the teacher to write out or dictate the problems to the pupils, who tried to solve them by applying the appropriate rules, the teacher then correcting the answers. An important advance in teaching methods was made in 1851, when Warren Colburn published his Mental Arithmetic, which followed Pestalozzi's ideas of psychological and inductive organization of subject matter.

Dewey's³ philosophy of education took the form of a restatement of the aims of education in the light of the rapid social changes that had taken place in American society in the nineteenth century. According to Dewey, education should start with the psychological nature of the individual child in social relationships with his fellow human beings. Dewey pointed out that modifications of

2. R. Freeman Butts, A Cultural History of Education, p. 504.

3. Ibid., p. 522.

2000 words. It consists of two main parts, the first containing an account of the life and times of the author, the second part giving a detailed description of his publications, and the third part containing his correspondence, all written in chronological order.

The author's life history should include a full account of his personal experiences and his professional attainments, including his work as a teacher, his researches, his publications, his travels, his social activities, and his contributions to science and literature. The author's life history should also include a detailed account of his family, including his parents, brothers and sisters, and other relatives, and a brief account of his education, including his primary and secondary school days, his college years, and his postgraduate studies. The author's life history should also include a detailed account of his professional attainments, including his publications, his teaching experience, his research work, and his contributions to science and literature. The author's life history should also include a detailed account of his personal experiences, including his travels, his social activities, and his contributions to science and literature.

It is suggested that the author's life history should consist of two main parts, the first part giving a detailed account of the author's life and times, and the second part giving a detailed account of his publications, and the third part giving a detailed account of his correspondence. The author's life history should also include a detailed account of his personal experiences, including his travels, his social activities, and his contributions to science and literature. The author's life history should also include a detailed account of his professional attainments, including his publications, his teaching experience, his research work, and his contributions to science and literature.

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methods and curriculum should consist in efforts to meet the needs of a new society. Accordingly the subject matter and methods of the school should be adapted to the child's needs.

As the twentieth century opened, paramount stress was laid upon the acquisition of knowledge and skills in the fundamental processes. Various reforms entered in, attempting to individualize instruction, such as the project method, unit plan, and activity movements. William H. Kilpatrick of Columbia University was the leading exponent of the experience curriculum, while Helen Parkhurst devised the contract plan at Dalton, Massachusetts, and Carleton Washburne instituted the unit plan at Winnetka, Illinois, all of which adjusted the speed of achievement to the abilities of the individual. Most educators were urging the expansion of the services of elementary schools to include more attention to such activities as child study and special treatment of exceptional children. Both World Wars and several depressions helped stimulate activities along these lines.

In 1930, there were 354 cities of 10,000 population and over, with special classes where programs of training that would materially assist the mental deviate in becoming self-supporting were followed. Mastery of the fundamentals in arithmetic has been sought by the method of repetition. According to Heck⁴ methods have emphasized the use of

4. Arch O. Heck, The Education of Exceptional Children, p. 367.

concrete materials, and a plan of instruction that places great emphasis on repetition followed.

By 1948, the State of Florida had instructional units set up for the mentally retarded in thirteen counties with a total of forty-four units and a total enrollment of 595 white children and 82 Negro. In 1948, Polk County accepted the responsibility delegated to it by the permissive legislation enacted by the State in 1947, of providing an adapted program for the children of the county who need it. Eleven classes were set up at this time.

To date, according to the United States Bureau of Publications, as well as Dr. Elise Martens, Chief, Exceptional Children and Youth, U. S. Office of Education, Washington, D. C., nothing has been written concerning methods of teaching arithmetic to mentally retarded children except short references to it in books on general methods.

Procedure in Collecting Data

Mathematics magazines, journals in the field of education and especially in the field of exceptional children, and all current periodicals have been followed for suggestions applicable to the felt need. All available books on methods, philosophy and psychology in the school, public and college libraries have been reviewed to secure additional information and viewpoints. A visitation program to observe the methods used at each grade level of elementary school as well as other special classes in Polk and Hills-

227. In July and August we made a tour, returning afterwards
to our headquarters back where we left it, and, on the 20th of
July, we drove south to Bismarck, Dakota, and took up our
quarters there for the winter. We were compelled to leave a
house there about 1880, as we could not find any other
which would accommodate us. But we were fortunate; for
Garrison was evidently the only one who had any house available
then. It was very simple, and the walls were half mud and
half brick. It was the same house in which we now live.
The present author built out or addition, and so of
course, which greatly added to its size. In addition
we have added a porch, and the entire is in excellent
condition. We have no servants, as we do not require
any, though we have a large number of children and
adolescent boys, who are all at home.

OUR POSITION AT BISMARCK

We are still at about the same point in
condition, notwithstanding the fact that we have added
a porch and balcony, and great alterations have been
made in the interior. The house is well up to modern
views, though not yet completed. The greater part of
the work has been done by our sons, and we have
not engaged any laborers. We have, however, engaged
a carpenter, and he is doing his best to complete the
work. We have also engaged a mason, and he is
working on the porch, and will probably complete
it in a few days. We have also engaged a painter,
and he is painting the exterior of the house, and
will probably finish it in a few days. We have
also engaged a plumber, and he is working on the
interior of the house, and will probably complete
it in a few days. We have also engaged a
carpenter, and he is working on the exterior of the
house, and will probably complete it in a few days.

borough County was carried out by the writer. A written plan of the daily procedure was kept on the actual experiences with the class since September, 1948, by the investigator.

Field work in a Settlement House in Nashville, Tennessee, while enrolled in Scarritt College for Christian Workers formulated a desire on the part of the writer to do further work with underprivileged children, and has provided stimulus for years to help those who especially need help.

Teaching Seventh Grade Arithmetic to six classes a day and remaining after school to give individual help to those who were deficient in arithmetical skills provided the basis for selective preparation for collecting and applying the needed materials.

Procedure in Treating Data

The felt need, that of formulating some method of teaching arithmetic to mentally retarded children, will be viewed in the large and expanded by opinions of educators. Specifically, methods tried with the special class in Lakeland will be presented and test results to validate beliefs will be included.

The specific problems will be satisfied by presenting the descriptive characteristics of the mentally retarded child, the nature of the learning process, the arithmetic essential for the mentally retarded, and the methods used to teach arithmetic to mentally retarded children.

and the number of students who have been accepted into
the program. This year we will be accepting approximately 1000
students into our program. We are also looking forward to the
inauguration of our new building in the fall of 2009.
The new building will be located on the corner of 10th and
Main Street in downtown Greeley. It will be a modern, state-of-the-art
facility that will provide a safe and comfortable environment for our students.
The new building will feature a large auditorium, several classrooms,
and a variety of other facilities. The new building will be a great addition to our school and will help us to continue to provide
the best education possible to our students. We are excited about the
future of our school and look forward to seeing what the next few years bring.
We are grateful to all of our supporters for their continued
support and dedication to our school. We are also grateful to our
students and their families for their hard work and dedication to
our school. We are proud to be a part of such a wonderful community.
We are looking forward to the future and the many opportunities
that lie ahead. Thank you for your support and we hope to see you
soon at our school.

CHAPTER II

THE CHARACTERISTICS OF THE MENTALLY RETARDED CHILD

"Among all the groups of children for whom special education is provided, perhaps none needs to have its causes presented more clearly than does the group designated as children of low I. Q."¹

This need has become acute because of the heterogeneous basis for selection and classification of the group, the methods varying from that of observation of the practical adaptability of children to social living, to the more definite divisions on the basis of intelligence tests, and the multiplicity of terminology used to designate the group after it was selected. In 1931, in the Report of the White House Conference,² new classifications were made giving the terminology "mental defective" to those with mental ages below half their chronological age, and "mentally retarded" to those with mental ages from one-half to three-fourths their chronological age. Ingram³ used this classification for mentally retarded, listing the average as 67. Ingram also states that 2% of all children should be enrolled in special classes for the mentally retarded. Kirk⁴ states

1. Arch O. Heck, Education of Exceptional Children, p. 342.

2. White House Conference on Child Health and Protection, 1933, Report of the Committee on Physically and Mentally Handicapped, p. 357.

3. C. P. Ingram, Education of the Slow-Learning Child, p. 419.

4. Samuel A. Kirk, Teaching Reading to Slow-Learning Children, pp. 1-2.

that any child who has an I. Q. below 80 and who is not progressing in school at the same rate as other children may be considered mentally retarded. He divides the group educable in the public school into two groups, designating those from 50 to 70 as those who with adequate training can become self-supporting, and who educationally may attain a level between the first and fourth grades. Those whose I. Q. is roughly between 70 and 80 may reach the eighth grade and are usually capable of self-support and frequently can compete with other members of our society. Martens⁵ states that two to five per cent of the juvenile population can be considered retarded mentally; therefore in Lakeland, Florida, with a white school enrollment of 4,300 there are probably 86 or more mentally retarded.

Educating mentally retarded children requires keen insight into their characteristics. In many ways all children are alike. The variations when they appear are mainly a matter of degree. All children crave praise and recognition and a sense of security. All children want to play and be happy, yet all have fears and worries, and have the same inquisitiveness about their origins. All develop from infants to maturity even if at a different rate and to a different level of maturity.

Also in many special ways, the characteristics of the

5. Elise H. Martens, A Guide to Curriculum Adjustment for Mentally Retarded Children, p. 7.

and not of one day or week, but of months and even years that have
in their insidious and subtle ways won us the bodies of numerous
men and women, and enabled all industries including Government
and health organizations, business, and even Education, adding to
general good will and better educational efforts, our roads are full of the
people who are now off the beaten track and have no money either
to buy food or to pay rent. Our men and women left mounted
upon horses and riding out alone, and the old men & women staying at
home without any transportation to follow others upon the
roadsides, waiting for the passing train. The situation was
extremely difficult and the state of mind of most of the people
terrible, and especially among the colored population of our
own, while 80% of the unemployed families which I have seen
are in the condition of having nothing to eat and
have no money to buy food, either for themselves
or for their children, and the number of cases
of starvation and death among them is
increasing daily.

mentally retarded differ from those of normal children. In addition to the gross retardation in terms of mental age, Baker lists qualitative psychological ways in which they are backward:

"They follow a tendency to stereotyped answers by repeating the same response to different questions; they lack powers of self-criticism; their powers of association are limited; they are unable to keep unusual instructions in mind, but return to traditional methods; they fail to detect errors and absurdities in statements and in common-place situations; they tend to have concrete abilities rather than abstract; they have limited powers of reasoning, visualization and similar mental traits."⁶

Baker, in discussing the nature of intelligence says:

"Definitions have been formulated to describe intelligence from a practical point of view. Binet defined intelligence as the ability to take and maintain definite direction, as adaptability to new situations, and as ability to criticize one's own acts. Woodworth had a somewhat similar concept in retentivity, or the ability to use facts and activities already acquired, by ready adaptability to novel situations, by curiosity, interest in, and desire to know about things, and by persistence, or the trait of sticking to what is begun. These definitions emphasize adaptability to life situations which would include not only school learning but practical adjustment to neighborhood, and to social customs. In these fields of practical applications, Thorndike proposed three areas of intelligence: the first is abstract, or the ability to understand and manage ideas and symbols such as words, numbers, scientific principles and similar facts; the second is mechanical intelligence, or the ability to learn, understand and manage things and mechanisms; and the third is social intelligence, or the ability to manage people, and to act wisely in human relations."⁷

6. Harry J. Baker, Introduction to Exceptional Children, p. 258.

7. Ibid., p. 227.

Thorndike⁸ lists three ways individuals differ in intelligence as level, or difficulty, area, or experience, and speed, or quickness of mental activity. The factor of level is important, for unless an individual does not develop into the higher levels, he is considered mentally retarded. However, the second factor of area offers the greatest opportunity for real challenge in educating the mentally retarded for a mentally retarded child with a level of eight or nine years may have an array of experiences and good adjustment to simple environment so that he can achieve to a degree of self-realization. The speed factor has little worth for the mentally retarded for the lack of speed is one definite characteristic.

It was once believed that mentally retarded children developed mentally as did normal children but stopped developing earlier.

Kirk⁹ reviewing the experimentation of Kuhlmann and Moore stated that the mentally deficient child is retarded from the beginning and, if anything, gradually becomes more retarded. All studies and observations show that the mentally deficient learn more slowly and retain less than normal children. Kirk in answering the question as to how the mentally deficient compared in learning ability with normal children

8. E. L. Thorndike, The Measurement of Intelligence, pp. 1-36.

9. Samuel A. Kirk, Teaching Reading to Slow-Learning Children, p. 8.

and at middle ground there is a general trend toward more
conservative views among Republicans and less conservative
views among Democrats. This is true in both the House and the Senate and
for most Committees. Interestingly, though, the House and
Senate Committees of Rep. and Sen. have different views on
most issues. In particular, the House is more conservative than
the Senate on issues such as abortion, gun control, and gay rights.
In contrast, the Senate is more conservative than the House on issues
such as the death penalty, environmental protection, and
immigration. This pattern of views is consistent across all
Committees, though there are some differences between the House and
Senate on some issues. For example, the House is more conservative
than the Senate on issues such as abortion, gun control, and
immigration. In contrast, the Senate is more conservative than
the House on issues such as the death penalty, environmental protection,
and immigration.

The results suggest that Republicans are more conservative than
Democrats on most issues. This is true in both the House and the Senate and
for most Committees. Interestingly, though, the House and the Senate
have different views on some issues. For example, the House is more
conservative than the Senate on issues such as abortion, gun control, and
immigration. In contrast, the Senate is more conservative than
the House on issues such as the death penalty, environmental protection,
and immigration.

Overall, the results suggest that Republicans are more conservative than
Democrats on most issues. This is true in both the House and the Senate and
for most Committees. Interestingly, though, the House and the Senate
have different views on some issues. For example, the House is more
conservative than the Senate on issues such as abortion, gun control, and
immigration. In contrast, the Senate is more conservative than
the House on issues such as the death penalty, environmental protection,
and immigration.

of the same mental age showed that the learning ability of mentally retarded children was equal to that of normal children over a short period of time. Surveys over a longer period of time showed that their rate of learning was slower because their rate of mental growth is slower. A six-year-old child with a six-year mental age will grow one year mentally in one year's time. A twelve-year-old subnormal child with a six-year mental age will grow mentally only one-half year.

As a group, mentally retarded children are slightly inferior to the average in physical development¹⁰ and show many deviations from the normal such as excessively large, or very small heads, crowded and poorly formed teeth, peculiarly shaped ears, and crossed eyes, in addition to defects of tonsils, adenoids, and glands. Usually there are two or more abnormalities per child. Also since speech is closely related to intellectual functions, a marked retardation in speech is frequently found.

Baker¹¹ lists the causes and characteristics of mental retardation by types. Cretinism causes by hypothyroidism, or deficiency of thyroid, gives certain physical deviation such as short legs and arms, short stubby fingers, square body proportions, short neck, protuberant stomach, dwarfish

10. Harry J. Baker, Introduction to Exceptional Children, p. 261.

11. Ibid., pp. 262-266.

The following statement will suffice to prove that this
white feather is that of a large bird, probably a heron, of which
there was a large colony just to below this point last
winter, and it is natural to infer that these birds had been
accidentally driven at dinner, because the area about covered
was very large, like the Indian country around Lake
Michigan. The question is, whether there may not be some
other explanation of this white feather except a bird
driven.

It is possible that the feathers of different species of
birds may be intermixed, so that we might get them from
several different species. This is however, a most unlikely
possibility, because the feathers of all the species of birds
which are found in this country are very similar in
color and size, and it is difficult to distinguish between
them. It is also possible that the feathers may have
been taken from a dead bird, which had been killed by
some animal or man, and had been left lying on the ground.
This is however, a most unlikely possibility, because
it is very difficult to find a dead bird in this country,
and it is even more difficult to find one which has
been killed by some animal or man. It is also possible
that the feathers may have been taken from a dead
bird which had been killed by some animal or man,
but this is also a most unlikely possibility, because
it is very difficult to find a dead bird in this country,
and it is even more difficult to find one which has
been killed by some animal or man.

size and limited mental ability. Mongolism, a type caused by a failure to develop, often caused by exhaustion of the reproductive powers of one or both parents, resembles closely the Mongolian race, having an oblique slant to the eyes and scanty and wiry hair. Usually the mentality is very low and development very slow. Microcephalism, is the type when the brain is only about one-fourth of its usual weight at birth and fails to develop, hence the skull does not have to grow to its formal size. Hydrocephalism is caused by an excess of cerebrospinal fluid in the brain and total cranial area, which causes the skull to grow to an abnormal size. Head injury at birth, or cerebral anoxia caused by a lack of oxygen for the child at or during birth causes deterioration of the brain tissue. Diseases such as paralysis, meningitis, and even severe cases of childhood diseases such as measles causes a mental retardation if there is a destruction of the brain tissue. The major cause of mental retardation is heredity.

Personality and social maladjustments are important factors in determining the success or failure of mentally retarded children. As a group they are more susceptible to these disturbances than the average children. However, there is no reason to suppose that social incompetence is inevitable if proper adjustments are made.¹² They may de-

12. Luella Cole and John J. B. Morgan, Psychology of Childhood and Adolescence, p. 311.

whereupon he returned to his former position. He was soon promoted to the rank of Captain and given command of a company of 100 men. He did not like the life of a soldier, however, and exchanged with his father, who had now established himself in New York City, for a post in the U.S. Custom House. After a short time, however, he again left the service to become a member of the New York Stock Exchange. He was a man of great energy and ability, and his success in business was soon apparent. He became one of the leading brokers on the exchange, and his name was soon known throughout the country. He died in 1869, at the age of 55, leaving behind him a wife and two sons.

velop undesirable traits because too much is asked of them. They become accustomed to failure before they have a chance to succeed. They become disillusioned, unhappy, truculent, and sometimes delinquent. The teacher of mentally retarded children should instill in them, emotional attitudes and habits which will make moral citizens of them. If they become delinquent it is because of faulty training. Each child should be encouraged to develop any trait that will help him in his adjustment to life. For example, if a child can develop a responsiveness to people it will make a better impression. Cole and Morgan state:

"On the moral side the inability to think in abstract terms is especially noticeable. The word 'amoral' has been coined to describe the condition of a person who behaves contrary to accepted moral standards, not intentionally, but because he is unable to grasp the underlying concepts. A child must achieve a mental age of twelve before he develops even elementary concepts such as pity, sympathy or other virtues, and a considerable higher mentality seems needed for an adequate understanding of generalized principles of behavior."¹³

Kirk¹⁴ reviews a statistical study by Ackerson to show five ways mentally retarded children differ from mentally normal children:

- (1) They are retarded in school.
- (2) They are slower and duller in manner.
- (3) They are over suggestible.

13. Ibid., p. 314.

14. Samuel A. Kirk, Teaching Reading to Slow-Learning Children, p. 12.

- (4) They have preference for younger children as playmates, and
- (5) They object to teasing by other children.

He states further that mental retardation is accompanied by personality deviations which if not caused by the mental defect are certainly the result of mental retardation.

CHAPTER III

OBJECTIVES OF ARITHMETIC INSTRUCTION FOR THE MENTALLY RETARDED

"The problem is to teach these retarded children to know, and to behave, and to give them the necessary knowledge to succeed to the limit of their ability and social level, and to train them to social habits which will enable them to behave perhaps above the limit of their mental ability and social level."¹

Serious consideration must be given to the curriculum best suited to the needs of the children of this class. The aim is to develop the child's mental capacities and the control of his emotions to the point of adequate social adjustment, and the curriculum must be set up to accomplish this. The first point of emphasis is what work these subnormals will eventually be able to do. They will not be able to enter the professions nor fill any of the complex positions of business. But according to statistics² they will be able to fill such positions as bricklayer, carpenter, electrician, sheet-metal worker, mechanic, barber, packing-house or cannning-plant worker, fruit-picker, dairy or ice delivery-man, or farm worker for the boys, while the girls can be trained for housework, restaurant or cannning plant work, or sewing, if under supervision and not required to

1. Special Education: The Handicapped and the Gifted, Committee on Special Classes, Section III, Education and Training, p. 446.

2. W. J. McIntosh, Follow-Up Study of One Thousand Non-Academic Boys, Journal of Exceptional Children, March 1949, p. 168.

do too difficult calculations.

McIntosh³ states that records were kept on 52 men with I. Q.'s less than 60, who were gainfully employed with salaries ranging from \$18.00 to \$40.00 per week, and who had held the same jobs from two to nine years. In presenting various findings of the comparisons of the work records of men of low I. Q., it was found that emotional stability and personal drive had more to do with the amount of wages earned than the I. Q., and that both of these factors were amenable to change by the educational process.

All mentally retarded children should, if possible, learn to count money accurately and to tell time. All should be familiar with banks, writing checks, Post Offices, the general facts of savings, and have a knowledge of the fundamentals that will give them skill in solving life's problems which will confront them quantitatively. They should be taught to read and understand not only the minimum mathematical terminology, but also to read the "help wanted" advertisements, the "lost and found" column, and food and clothing advertisements. The formation of desirable habits in a social way are as important as the development of good health habits for the observance of general rules such as punctuality and regularity are essential in the business world.

3. Loc. cit.

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other and it can lead from primary high school "graduation" to the sophomore classifying year one, the next year at U. of Texas with Dean, senior may 00.00 or 00.10 most probably because of tuition fee, a sum equal to that cost of room and board in addition will be accommodation and in residence subsidies. The additional graduation fees money used for the student to meet expenses to students will take up of time and effort necessary more efficient result to meet their expenses. If all this factors necessary consideration will get up to date of education, education will be more profitable before the students leave.

22. and M. First or has educational system based on small schools such schools will be more difficult to maintain and attend and to implement a new law requires the school operating authority sufficient of time and effort to implement and put into effect. Implementing such procedure will be the problem only with those who have been long in higher or highest class" and some of such does not understand Constitution and the motto "In God We Trust" and government functions should be different and implementing such goals has been recommended by the Board of Education and established when founded, the motto made up and placed official body to prove the Government and implement the education as soon as possible. After mentioned goal

It becomes necessary to break away from traditional courses of study with respect to subject matter and methods of instruction because it is not a question of preparing these children for high school but for life, and too, the interpretation of the life they are facing today. Learning activities should be based on those included from the kindergarten through the eighth grade but the upper level for actual work for most will probably be the fourth grade. However, the real differentiation consists fundamentally in difference of quality, not quantity of materials or skills. This cannot be achieved by the simple process of studying the standard curriculum more slowly, nor even in limiting the amount given. Subnormal children cannot acquire as much in quantity, or in as short a time as normal, but the need is even greater than this. Special methods of instruction and longer periods of time are needed but more than this, these children require instruction in a field which is entirely omitted from the standard course of study. Normal children are expected to acquire such information from their natural environment. Much that is self-evident to the normal children as a part of their home training must be taught from many aspects to retarded children and drilled upon until it becomes habitual. Also the time element enters in. The lower the degree or level of intelligence, the earlier should attention be centered on vocation for the

more habitual must all responses necessary for it be made. Also the less important do other responses become.

The formation of useful habits becomes the ultimate objective. The normal child can examine and criticize, and change as the occasion demands, but the retarded child can only apply what habits he has learned. Again in contrast to the normal, the subnormal must have more habitual responses than the normal for he will not be able to make new ones to suit the occasion. The retarded child can be prepared for independence if placed in a position where complicated reasoning is eliminated and a large number of habitual responses substituted.

The White House Conference Report⁴ speaking of the extent of Education stated:

"In order to accomplish the ideal of equality of opportunity for all children, opportunities must be provided for the mentally retarded to learn how to live completely and successfully on their own intelligence levels. Education must be given which will permit them to engage in the work of unskilled labor and live happily in the humblest group. Special abilities should be sought out and developed and as is the case with all types of handicapped children, the disability should be minimized, not stressed. As life in the world today demands some ability to read, write, and cipher, for successful living, these subjects should be taught, along with the development of manipulative skill, a sound body and good habits."

The maximum abilities of the child must be lined up with the minimum demands of society, and as closely as

4. White House Conference on Child Health and Protection, Report of the Committee on Physically and Mentally Handicapped, p. 478.

possible, an educational program set up that will be flexible and adjustable and serve as a path leading to a definite goal.

Actual practice in solving problems of daily life that are of concern to the pupil is a most valuable type of experience in democratic living. In most instances arithmetic makes a valuable contribution to these experiences. This happens when quantitative procedures are used in gathering data, keeping records, and showing essential relationships. The pupil will not only learn about arithmetic and its functions in daily life, but desirable personality traits and social characteristics will be developed. Attitudinal development is probably more important than informational materials. The realization of the need and value of receiving advice concerning investments from a banker or lawyer is more important than learning the routine facts of banking. The realization of the dangers of accepting advice from strangers, salesmen, or uninformed friends is more valuable than the factual knowledge of investments.

The objective then is to teach the mentally retarded child to the extent of his ability to learn rather than to attempt to make him conform to the normal child. He should be trained in so far as possible to take his place in the social order.

Kelley states:

"The general objectives of curriculum planning for the mentally retarded are the same as for

— und der Begriff wird von dem anderen Theologen wieder aufgenommen und erweitert zu „christliche Theologie“.

the second edition form of this work advance the
subject-matter beyond what will suffice to make up a complete
and moral work which is destined to be of service to
men. I have now written a new edition, which presents
a history of the period from the time when the personal
introduction of the author to the Duke of York failed, and
which will give additional facts and information from other
sources which will affect the subject of the present work.
I have also added a chapter on the Duke of York's
character and conduct, and another on the conduct
of the author from his return to Scotland, May 1715, till his
death in 1721, in which he is shown to have been a
man of great virtue and talents, and of a very
modest exterior, well educated, and possessed of a very
fine judgment, but singularly ill-fitted for a
military career, and yet who, though he had
been destined to a different destiny, yet had a
singularly useful life, and was a man of
great worth, and of great merit to his country and to
the cause of liberty.

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2000 m above sea level in the Andes, and 1000 m above sea level in the Andes.

the normal since all individuals should be guided toward attainment of self-realization, acceptable human relations, economic efficiency, and civic responsibility. The selection of approaches would be the same for they would serve as pathways over which each would pass to achievement."⁵

5. Elizabeth Kelley, "Curriculum Planning for Exceptional Children," Journal of Exceptional Children, February 1948.

and where I am going. The world is changing
and so is China. We have to adapt to the new
situation. This is a difficult process, but it is
necessary for our country to move forward.
We must work together to build a better future
for all Chinese people. This is our responsibility.
I believe that we can achieve our goals if we
work hard and stay focused. Let's continue to
strive for progress and success. Thank you.

CHAPTER IV

METHODS OF TEACHING

Arithmetic is defined in the Bulletin¹ of the Florida State Department of Education as a system of quantitative thinking. The need for quantitative thinking arises early in the life of any child and increases with the demands of the social and physical environment. Breaking the quantitative idea down into mathematical concepts that are essential for a child or adult in the environment of today, four major divisions will appear: the concept of time, the concept of length, the concept of mass, and the concept of value relative to money or exchange.

These four abstract concepts must be presented in concrete form in order for the mentally retarded child to grasp them. The child whose mental age limit is five or six will never be able to do more than simple counting of objects actually before him.² Since he has no conception of number, he will have to count concrete objects actually touching them as he counts, and a peculiar fact is that he cannot add to a number already counted. For example, he may count three pennies, one, two, three, and if given two more, cannot continue four, five, but must return and count all

1. Florida State Department of Education, Arithmetic in the Elementary School, Bulletin No. 26., p. 6.

2. Grace M. Fernald, Remedial Techniques in Basic School Subjects, p. 267.

which are fulfilled with the intention of
obtaining money or property & by which it is intended to be obtained. These
false value judgments evaluations are then set up
by which the other person can decide to do this or that
-thing and therefore whenever you try to follow that
path you have to go through evaluations which will tell you
what you ought to do and what you ought not to do
and will lead to doing bad things like evaluation of
the persons with whom you happen to meet. Until the time
you follow the path of evaluating others
and all instances of their actions become good and
as little damage as possible and not take up more time
to evils of this way because there will not come
in addition effects with which all life of human being gets
polluted by that kind of mind. And so when you do
any action always try to avoid all kinds of harm to
all kinds of best qualities in that person who is most prominent
and following off. So when you do any kind of the human
work and work in the world, you can always do good
like helping one another when you work with your families because

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again, one, two, three, four, five. Therefore, concrete materials must be used in many forms--bottle caps, strips of colored paper, marbles, toothpicks, books, pencils, paper, desks, windows, doors, children, money, letters, stamps, oranges, and any and all the various things that the teacher and pupils can collect. The smaller materials may be placed on a counting table where the child may feel free to go and solve at his own speed any problem that confronts him. Soon such a feeling of security comes to the pupil who has met with success at the counting table that his best work will be accomplished there. Clark, Otis, and Hatton³ suggest that for the normal child it is better for the teacher to picture pennies at the blackboard or designate them by symbols such as circles or crosses than to supply each pupil with real or play money. This is not as effective with the mentally retarded children as with using real or play money. They state that the representation is less distracting, and that the learner can better direct his thinking to the idea. Mentally retarded children need the sensory value of touch to help make the impressions of idea. In experimenting on this problem, it was found that if the symbols were written on the board, frequently the pupil would leave his seat to go to the board to touch each symbol to count them.

3. John R. Clark, Arthur S. Otis, and Carolyn Hatton,
Primary Arithmetic Through Experience, p. 14.

the first place, the most important thing is to have a good
knowledge of the language and the grammar of the language. The
second place, the second most important thing is to have a good
knowledge of the history and culture of the country. The
third place, the third most important thing is to have a good
knowledge of the politics and economy of the country. The
fourth place, the fourth most important thing is to have a good
knowledge of the geography and climate of the country. The
fifth place, the fifth most important thing is to have a good
knowledge of the literature and art of the country. The
sixth place, the sixth most important thing is to have a good
knowledge of the science and technology of the country. The
seventh place, the seventh most important thing is to have a good
knowledge of the social and political system of the country. The
eighth place, the eighth most important thing is to have a good
knowledge of the religious and spiritual beliefs of the people.
The ninth place, the ninth most important thing is to have a good
knowledge of the customs and traditions of the country. The
tenth place, the tenth most important thing is to have a good
knowledge of the international relations of the country. The
eleventh place, the eleventh most important thing is to have a good
knowledge of the environment and ecology of the country. The
twelfth place, the twelfth most important thing is to have a good
knowledge of the economy and finance of the country. The
thirteenth place, the thirteenth most important thing is to have a good
knowledge of the law and justice system of the country. The
fourteenth place, the fourteenth most important thing is to have a good
knowledge of the education and health care system of the country.
The fifteenth place, the fifteenth most important thing is to have a good
knowledge of the sports and recreation activities of the country. The
sixteenth place, the sixteenth most important thing is to have a good
knowledge of the arts and crafts of the country. The seventeenth
place, the seventeenth most important thing is to have a good
knowledge of the architecture and engineering of the country. The
eighteenth place, the eighteenth most important thing is to have a good
knowledge of the agriculture and animal husbandry of the country.
The nineteenth place, the nineteenth most important thing is to have a good
knowledge of the mining and mineral resources of the country. The
twentieth place, the twentieth most important thing is to have a good
knowledge of the space and defence technology of the country.

The meaning of number impresses itself upon the child through group consciousness rather than "numberness." Groups of different objects become identified by a sameness of number so that the number relationship becomes a fact; finally, after repeated counting of concrete objects, abstract counting will become habitual whether it is understood or not.

Four techniques of developing learning were used: namely, the technique of auditory association, saying "three and two are five," the visual association of seeing three objects and two objects grouped, the imagery association by thinking of and recalling three objects and two objects, and the tactful association of touching two objects and three objects in a group. The hand kinesthetic method of tracing words and numbers, though very slow, proves effective. This method consists of having the child pronounce the word while he traces it with his finger or with a pencil, and then with eyes closed goes through the motion of tracing or writing it until he can reproduce it correctly. All of these methods, visual, auditory, imagery, and tactful, were used separately, and as a combination. Because each child is a different individual, no one method becomes best for all, but the combination of all with major emphasis on the tactful or kinesthetic seemed most effective.

The degree of deviation from the normal will determine the complexity of the process that can be developed in the

child. The final level of his development will probably be approximately that of the child whose actual age corresponds with his mental age. Thus as soon as the mental age is known two steps are necessary. First it is important to discover his arithmetic age or readiness for arithmetic for if he has not had instruction in arithmetic, or if he has not been able to profit by the type of instruction given, he may not be developed arithmetically to his mental age. Second, it is necessary to determine what facts he is capable of mastering at the mental age. Several readiness tests are available, but Brueckner's⁴ readiness test seemed the most applicable to this locality. It consists of forty questions to be read by the teacher and answered or directions followed by the pupil. Fifteen must be answered to give a readiness level for the first grade, twenty-five for the second, etc.

Gradation level is ignored with the mentally retarded. Pupil need and the degree of the learning difficulty determines the content. The pupils are treated on an individual basis and assignments required to meet the individual needs are made for each as a daily assignment even though a unit including several pupils may be the interest motivating factor determining the assignments. Mental level or arithmetic level replaces the gradation level. Much research

4. Leo J. Brueckner and Foster E. Grossnickle, How to Make Arithmetic Meaningful, pp. 56-58.

has been done by Brueckner, Brownell, Osburne, The Committee of Seven under the direction of Washburne, and others to determine the grade placement of instruction of the number processes in the schools of the country. Brueckner reviewed all these available research findings and from them prepared a tentative arrangement of the subject matter of arithmetic according to mental level at which the available evidence showed that the major sections could be taught successfully to completion. Because this was most helpful in interpreting and choosing materials to be taught, his findings will be included.

RECOMMENDED GRADATION OF ARITHMETIC PROCESSES⁵

Mental Age	Whole Numbers	Fractions	Decimals
6-7	1. Counting 2. Identifying numbers to 200 3. Writing numbers to 100 4. Serial idea 5. Using numbers in activities of all kinds	1. Contacts in activity units and in simple measurements.	1. Tens as basis of number system
7-8	1. Reading and writing numbers to 1,000. 2. Concept development. 3. Addition and subtraction facts through six.	1. Recognizing fractional parts	1. Place value. 2. Zero as a place holder

5. Ibid., p. 90.

Mental Age	Whole Numbers	Fractions	Decimals
8-9	1. Simple addition and subtraction facts. 2. Multiplication and division facts through fives. 3. Related even one-figure division.	1. Extending use of fractions in measurement. 2. Finding part of a number.	1. Computing with dollars and cents. 2. Reading money values.
9-10	1. Completion of all multiplication and division facts and processes. 2. Uneven division facts and processes. 3. One-figure multipliers and divisors.	1. Extending use of fractions. 2. Easy addition and subtraction by concrete means.	1. Computing with dollars and cents in all processes.
10-11	1. Two-figure multipliers. 2. Two-figure divisors.	1. Addition and subtraction of like fractions.	1. Addition and subtraction of decimals through hundredths.
11-12	1. Three and more figure multipliers. 2. Two-figure divisors when estimated quotient must be corrected.	1. All processes of fractions completed, including unlike fractions.	1. Multiplication and division begun.

Although the gradation by mental age was used as a guide, it could not be adopted as a standard because the mentally retarded child with a chronological age of sixteen and a mental age of eight who is gainfully employed, drives a car, has dates, and is largely his own guardian socially, needs much more in

arithmetic instruction than does an eight year old who may be starting the first study of organized arithmetic. He needs interpretation of facts and numbers from a child point of view but on an adult level of values. He has already experienced sums of money and has become distance and time conscious on an adult pattern. However, his attention and memory span is so short that those basic facts, already automatic with the normal child, are still vague abstractions to him.

No one method of teaching fundamentals will be best for all groups or for all in a group, but the approach which proved most effective was a combination of several methods. Addition and subtraction were taught together as a relationship. Two oranges and three oranges became a group of five, and if two were taken away, three were left. Then after repeated grouping of objects were rearranged until the number fact became real, three plus two became five and five minus or take away two was equal to three. In order to form the number awareness necessary, mimeographed pages of the 100 basic addition problems were used from the first. If the child had no conception of number grouping, he went to the counting table and counted out the number of concrete objects needed and formed the groups, and then counted the entire group. The first test responses were checked merely for errors or numbers missed. If five or less errors occurred on one test sheet, the errors were discussed and corrected

and another test sheet of the same basic 100 problems was worked. If more than five errors were made, individual help in actually grouping concrete objects was given with a practice test run, the errors corrected and then the test attempted again. Each test had to be perfect before it was left. If after a second attempt errors still occurred, a practice test was given with the instructor watching the pupil response and attempted response. Many faulty methods came to light. A common fault was for the pupil to choose one number, such as two, and proceed to search the entire 100 problems for the ones containing two. Thus from the 100 problems, $1 + 2$, $2 + 2$, $2 + 3$, $4 + 2$, etc. would be picked out and solved. This slowed the work and often confused the pupil so that he would omit many problems.

The same methods were used with subtraction. Since some pupils already had methods by which they had been taught, unless the methods were found to be incorrect, they were allowed to continue to use them though other methods were introduced so that a choice could be made if another proved more effective. In addition, 2 oranges and 2 oranges are four oranges became 2 and 2 are 4, then 2 plus 2 equals 4, and finally $2 + 2 = 4$. Zero was explained as a place filler which carried no number value. Addition without carrying was introduced to challenge the interest and develop self-confidence. 13 plus 40 could be added as easily as the basic problems and gave such a feeling of accomplishment that

longer problems such as 8,425 plus 321 were used. When addition with carrying was given, the instructions were given to carry the tens number and write it at the top of the next column. In order to show the relationship between horizontal and vertical addition and also as a game for stimulating interest, problems such as the following were used with much success:

$$\begin{array}{r} 3 + 4 + 7 + 2 = \\ 5 + 2 + 6 + 1 = \\ 2 + 6 + 8 + 9 = \\ 6 + 1 + 2 + 4 = \end{array}$$

The answers to the horizontal sums were placed at the right, and the sums of the vertical columns at the bottom of each. Then the sum of the bottom horizontal problem should equal the sum of the vertical column of answers. Some drill was used to add to total of ten although all did not use this method.

Subtraction was taught by the "take away" method although one pupil used the additive method such as how much do you add to six to give ten. Borrowing in subtraction was taught by actually crossing out the number in the minuend and writing the new number to avoid confusion.

Multiplication and division were taught together with concrete objects representing various things. The High School band is familiar to all the pupils so buttons were used to form the lines of members of the band who march be-

the same time 100,000 people were available to help construct the new structures while additional
time was given to the workers to complete their work at a rate of
approximately 100,000 cubic feet per day or about 300,000 cubic feet per
day, which is the same rate of construction as the original plan. The
new structures will be completed by the end of the year.

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which will be found in every town throughout the country and
which he wishes to be removed before it becomes too late and the
country becomes entirely infested with them and until
new States are formed to control their progress & to see that
they do not spread throughout the land.

tween halves at the football games. Ten buttons in a row and five rows showed the multiplication fact of fifty. The reverse of this to divide the fifty members of the band into ten rows showed the quotient five. As long as it was needed, the child went to the counting table and worked out the answers but in time most of the answers became habitual responses.

Individual charts were kept by each pupil so that he could make a record of his daily score. He was competing with himself and could progress as fast as he was able. Praise for the smallest attainment, public recognition of all achievement and comparison of the individual charts motivated the learning as did the fact that for the first time these children were doing something that they understood and could do, kept the interest high. Every paper that was worked was checked and added to the personal file of the pupil. Each pupil kept "My Arithmetic Notebook" in which he wrote down the facts that he learned and wanted to keep. Those who finally progressed to multiplication thus had their tables but not until they themselves worked them out and understood them. Because no workbook was found that answered the needs of the group, the practice materials were copied from Wheat,⁵ Wilson, Stone and Dalrymple,⁶

5. Harry Grove Wheat, Psychology and Teaching of Arithmetic, pp. 302-303.

6. Guy M. Wilson, Mildred B. Stone, and Charles O. Dalrymple, Teaching the New Arithmetic, p. 403.

Greene and Jorgensen,⁷ Osburne,⁸ Brueckner,⁹ or given by systematically listing the forty-five primary addition facts as:

1	1	1	1	1	1	1	1	1	1
<u>1</u>	2	3	4	5	6	7	8	9	2
2	2	2	2	2	2	2	2	2	2
<u>2</u>	3	4	5	6	7	8	9	2	
3	3	3	3	3	3	3	3	3	
<u>3</u>	4	5	6	7	8	9	2		
4	4	4	4	4	4	4			
<u>4</u>	5	6	7	8	9	2			
5	5	5	5	5					
<u>5</u>	6	7	8	9					
6	6	6	6						
<u>6</u>	7	8	9						
7	7	7							
<u>7</u>	8	9							

Games furnished the drill and motivation for further study. Because it was impossible for all to keep facts in mind, the teacher would write a number on the board and ask for all the combinations that would add to give that answer. These would be written on the board. An example of this is $0 + 5$, $1 + 4$, $2 + 3$, all give five. After several groupings had been written, the old game, "I am thinking of two numbers" would be played. The pupil calling the right combina-

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7. Harry A. Greene, and Albert N. Jorgensen, The Use and Interpretation of Educational Tests, p. 241.
 8. Worth J. Osburne, Corrective Arithmetic, pp. 155-168.
 9. Leo J. Brueckner, Diagnostic and Remedial Arithmetic, p. 223.

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tion was the leader of the next game. The same idea carried on through subtraction, multiplication, and division. Then flash cards were used to play various drill games. The most popular was baseball, where two sides were chosen, and the pitcher held up a flash card for the batter to add. If he give the wrong answer, or could not answer, it was a strike. If the bases were loaded, the different basemen were given a chance to answer, and if correct, could put out the men on the base. This proved to be so exciting that continuously pupils would ask for the flash cards to study the sums so that they might be better players. Bingo and dominoes and various versions of these games also helped build habitual responses. Games to build relationships were variations of the "I am thinking" game, such as "I am thinking of a number less than twenty-five." Each pupil could ask one question such as "Is it more than ten?" or "Is it less than eight?"

In order to test for meaning of symbols the author made up a type of problem that may not be ethical from a mathematical standpoint, but which was enjoyed and proved to be valuable from a meaningful point of view. It started with simple number such as:

$$4 + 8 \div 3 \times 5 = \underline{\quad}$$
$$\underline{\quad} \div 5 \times 3 - 8 = 4$$

and developed to:

$$18,264 - 18,200 \div 8 + 2 \times 3 = \underline{\quad}$$
$$\underline{\quad} \div 3 - 2 \times 8 + 18,200 = 18,264$$

introduction with all the help of the 20th century and our modern
times, which both are quite different, nothing seems to have
done well. The 20th century still has been very efficient
and the results were public and mostly forward and efficient
of all. When we come with our knowledge of what we have
achieved in our 20th century, you believe me, you can't help but
imagine your natural knowledge will always open doors with us
and not the 19th century, because of the progress of knowledge.
Development isn't addition or a lot larger size, you will see
in man, with others all these added up over time. From adding
the second day, with "natural growth" as the first, with each
second day being able to add more to another century
so gradually every year, until after 20 years, you can
imagine a "natural" of 2⁰ as done, giving "natural" as 2⁰ as
imagine, and the same thing with "natural" and each
"natural" each year, 2¹, 2², 2³, 2⁴, 2⁵, 2⁶, 2⁷, 2⁸, 2⁹, 2¹⁰, 2¹¹, 2¹², 2¹³, 2¹⁴, 2¹⁵, 2¹⁶, 2¹⁷, 2¹⁸, 2¹⁹, 2²⁰, 2²¹, 2²², 2²³, 2²⁴, 2²⁵, 2²⁶, 2²⁷, 2²⁸, 2²⁹, 2³⁰, 2³¹, 2³², 2³³, 2³⁴, 2³⁵, 2³⁶, 2³⁷, 2³⁸, 2³⁹, 2⁴⁰, 2⁴¹, 2⁴², 2⁴³, 2⁴⁴, 2⁴⁵, 2⁴⁶, 2⁴⁷, 2⁴⁸, 2⁴⁹, 2⁵⁰, 2⁵¹, 2⁵², 2⁵³, 2⁵⁴, 2⁵⁵, 2⁵⁶, 2⁵⁷, 2⁵⁸, 2⁵⁹, 2⁶⁰, 2⁶¹, 2⁶², 2⁶³, 2⁶⁴, 2⁶⁵, 2⁶⁶, 2⁶⁷, 2⁶⁸, 2⁶⁹, 2⁷⁰, 2⁷¹, 2⁷², 2⁷³, 2⁷⁴, 2⁷⁵, 2⁷⁶, 2⁷⁷, 2⁷⁸, 2⁷⁹, 2⁸⁰, 2⁸¹, 2⁸², 2⁸³, 2⁸⁴, 2⁸⁵, 2⁸⁶, 2⁸⁷, 2⁸⁸, 2⁸⁹, 2⁹⁰, 2⁹¹, 2⁹², 2⁹³, 2⁹⁴, 2⁹⁵, 2⁹⁶, 2⁹⁷, 2⁹⁸, 2⁹⁹, 2¹⁰⁰, 2¹⁰¹, 2¹⁰², 2¹⁰³, 2¹⁰⁴, 2¹⁰⁵, 2¹⁰⁶, 2¹⁰⁷, 2¹⁰⁸, 2¹⁰⁹, 2¹¹⁰, 2¹¹¹, 2¹¹², 2¹¹³, 2¹¹⁴, 2¹¹⁵, 2¹¹⁶, 2¹¹⁷, 2¹¹⁸, 2¹¹⁹, 2¹²⁰, 2¹²¹, 2¹²², 2¹²³, 2¹²⁴, 2¹²⁵, 2¹²⁶, 2¹²⁷, 2¹²⁸, 2¹²⁹, 2¹³⁰, 2¹³¹, 2¹³², 2¹³³, 2¹³⁴, 2¹³⁵, 2¹³⁶, 2¹³⁷, 2¹³⁸, 2¹³⁹, 2¹⁴⁰, 2¹⁴¹, 2¹⁴², 2¹⁴³, 2¹⁴⁴, 2¹⁴⁵, 2¹⁴⁶, 2¹⁴⁷, 2¹⁴⁸, 2¹⁴⁹, 2¹⁵⁰, 2¹⁵¹, 2¹⁵², 2¹⁵³, 2¹⁵⁴, 2¹⁵⁵, 2¹⁵⁶, 2¹⁵⁷, 2¹⁵⁸, 2¹⁵⁹, 2¹⁶⁰, 2¹⁶¹, 2¹⁶², 2¹⁶³, 2¹⁶⁴, 2¹⁶⁵, 2¹⁶⁶, 2¹⁶⁷, 2¹⁶⁸, 2¹⁶⁹, 2¹⁷⁰, 2¹⁷¹, 2¹⁷², 2¹⁷³, 2¹⁷⁴, 2¹⁷⁵, 2¹⁷⁶, 2¹⁷⁷, 2¹⁷⁸, 2¹⁷⁹, 2¹⁸⁰, 2¹⁸¹, 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Part I: Morphology

— 1 —

10. *Phragmites australis* C. Nees var. *australis*

Because of the variations in mental levels, few racing games were used. More games that allowed the child to compete with his own past record were used. One game that required quick thinking and automatic response was a card game of flash cards. Each child was given seven cards which he placed before him. Then the leader called a number. The first pupil to hold up the card with numbers the sum of which was the called number, turned in the card. If the response was incorrect, he not only kept the card but was also given another one. The winner was the first to get without cards.

Number recognition and meaning was promoted by introducing variations of charts and game devices on the matching idea. Inch cardboard or paper squares were cut and on the first twelve the numbers were written, one to each card. The next twelve contained the words one through twelve; the next set of twelve, either symbols from the typewriter or dots grouped from one to twelve; the next set, pictures cut from magazines or drawn; the next set, the Roman numerals, etc. The game was to arrange the numbers in order, then the word under each number, the symbol in its proper place, then the pictures, etc. Many variations were made and competition motivated the drill.

After the basic facts of the fundamentals were known this idea was carried further by using small squares each containing a number, or symbol such as +, -, ÷, x, or =. With the numbers arranged across the top as the answers, problems could

be made under each which would give the answer at the top. For instance, under the number 9 such problems as $6 + 3$, 3×3 , $18 \div 2$, and $11 - 2$ would be placed.

Another similar game device that was used for drill consisted of one large cardboard divided into squares with a problem exemplifying one of the fundamental processes written in each square. The answers were written on small squares which could be placed over the proper square. These games were easily made and were arranged from the earliest combinations to the more difficult so that provision for each mental level was taken care of and yet all could participate at the same time so that group rivalry was present.

Although Fernald¹⁰ states that it is useless to teach the defective child tricks in which numbers are used, the magic square, the trick of squaring numbers ending in 5 and some mathematical peculiarities such as:

$$3 \times 37 = 111$$

$$6 \times 37 = 222$$

$$9 \times 37 = 333$$

...

$$27 \times 37 = 999$$

or

$$\begin{array}{r} 1 \quad x \quad 9 \quad + \quad 2 \quad = \quad 11 \\ 12 \quad x \quad 9 \quad + \quad 3 \quad = \quad 111 \\ 123 \quad x \quad 9 \quad + \quad 4 \quad = \quad 1111 \end{array}$$

were used effectively.

Although methods used for teaching computational skills and quantitative relationships are presented separately, it does not mean that they were taught at different times, nor

10. Grace M. Fernald, Remedial Techniques in Basic School Subjects, p. 268.

of the same name, which was the original name of the town, and
which is still used by the Indians. It is situated on the south bank of
the Columbia River, about 10 miles from the mouth of the river, and
is surrounded by a range of mountains, the highest of which is Mount
Shasta, about 12 miles to the west. The town is built on a low
ridge, and is composed of a number of small houses, mostly made of
logs and brushwood, with thatched roofs. There are also a few
smaller houses, made of stone and mortar, with gabled roofs.
The town is surrounded by a number of fields, where the Indians
cultivate their crops, and there are also a number of orchards and
vineyards. The town is supplied with water from a stream which
flows through it, and there is a small mill on the stream, which
is used for grinding grain. The town is also supplied with
water from a well, which is located near the town, and is
supplied with water from a stream which flows through it, and
there is a small mill on the stream, which is used for grinding grain.

The town is surrounded by a number of fields, where the Indians
cultivate their crops, and there are also a number of orchards and
vineyards. The town is supplied with water from a stream which
flows through it, and there is a small mill on the stream, which is used for
grinding grain. The town is also supplied with water from a well, which is located near the town, and is supplied with water from a stream which flows through it, and there is a small mill on the stream, which is used for grinding grain.

The town is surrounded by a number of fields, where the Indians
cultivate their crops, and there are also a number of orchards and
vineyards. The town is supplied with water from a stream which

that different methods were used. Rather, the same methods were used and the same procedures followed for both and they were taught as an integrated unit rather than as a separate fact. The procedure followed for both consisted of a test to determine how much the child knew, then those factors that were needed in the immediate environment or would be needed in the future presented in concrete form. The methods became not isolated drills but systematic ways of presenting ideas in a variety of familiar situations so that a recognition of quantitative relationships developed along with and in addition to computational skills. Methods became ideas of procedure through which a pupil not only learned to do what he was told to do, but also, because he first dealt with groups that were easily manageable, understood and saw the significance of what he was doing and how the skill would help him function in his daily life.

Time is an abstract concept but when it is written down as a daily schedule that determines the activities in which the child enters, it becomes a concrete time table. This was the introductory method of teaching time. School begins at 8:30. We study arithmetic from 8:30 to 9:30, dramatics from 9:30 to 10:30, reading from 10:30 to 11:30, and have lunch from 11:30 to 12:00. The classes are one hour in length but the lunch period is one-half hour or thirty minutes. With a stop watch one second was measured. Then the counting of sixty seconds to make a minute was practiced.

The time was announced on the hour and the records of sixty seconds passed were made. Cardboard play clocks were used and group participation in showing and telling time with the individual clocks used at times for all to set the hands to show a given time and at other times for one pupil to set his clock and have the class tell the time. The compass was used to draw clock faces and Roman numerals were written on some. The radio was discussed as a time piece and records of the hour of favorite radio programs were made. Each child made a schedule of what he did each hour of the twenty-four and the number of hours needed for sleep and the importance of the regularity of meal-time was discussed. Calenders were made and the date marked off to designate the passage of time. The date each day was written and such time relationships emphasized as how many days to the end of the month, some special day, or how many days since something of importance had occurred. Individual birthdays and the year of birth were referred to often and the date of today in relation to the birth of Christ was emphasized. On excursions downtown, dates on the buildings and monuments were read to determine the age of each. Time-tables from the railroad, bus and airlines were explained with emphasis on the necessity of regularity and punctuality. The importance of the sun in telling time led to the discussion of and methods of making sundials. Pictures of the sundial at the Bok Tower were used.

The concept of length is one that is easily interpreted into concrete form. The first experience was to use rulers and yardsticks to measure the height of each pupil. In this experience the words length, height, taller, shorter, and long were used and the heights necessitated the introduction of inches, feet, and yards and their relationships. Then in arranging the classroom, various things were needed, for instance the class decided to place a small wire at the top of the blackboard along the front so that displays of art and other work could be clipped to the wire and thumb tacks would not be used. Measuring the length of the board was necessary and discussion of how much wire to buy formed a real problem.

Curiosity prompted the measurement of the room to determine its length and a steel tape was used for this so that the real meaning of feet extended into length was made in concrete form. Along with the discussion of time, each pupil was asked to count the blocks from his home to school and estimations as to the distance of each from school were made. The time-distance relationships were shown and oral problems were used, such as, Johnny lives ten blocks from school and can walk one block in two minutes. How long will he have to leave home to arrive at school ten minutes before school starts at 8:30? Given slowly and in an informal manner, this aroused much interest and all made attempts at answering and most of the pupils with the help of their

clocks solved it. Then others wanted to "make up" a problem about how they came to school.

Another interesting project was the watching of the construction of the First Baptist Church near the school. One trip was made during school to observe the construction of the steeple. The children made estimates of the height which were compared to the actual height as secured from the workmen.

Roadmaps and discussion of distances to towns in the county and state were used along with speedometers and other means of measuring distances, and from board drawings of locations of nearby towns, triangles and squares were introduced and problems worked finding the perimeters though only casual reference was made to that fact. It came through the use of illustrated problems such as, "If Bartow is fourteen miles south, Winter Haven twelve miles north east of Bartow, and Lakeland is seventeen miles west of Winter Haven, how far is it from Lakeland to Bartow to Winter Haven and back to Lakeland?

The girls learned to interpret patterns to some extent and measure cloth and cut out garments. The boys and girls measured wood and sawed various objects for craft work.

Scale drawings were used in art work and much use of the ruler was made. Also relay games of sides competing at the board in attempting to follow such directions as "Draw a line two inches long." "Draw a line ten inches long." And later, "Draw a line one-half foot long."

and more or less distinct, diffuse, granular, and yellowish-white.

The surface of many individuals shows
one or two shallow, irregular, and somewhat shallow depressions,
which are often surrounded by a thin, yellowish, crust-like skin, and
located on the midline. The epidermis of the skin is easily
removed without leaving any trace, and the underneath surface exhibits
a smooth, pale, yellowish, granular, and slightly wrinkled

surface. The epidermis is easily removed, and the underlying
substance is a pale, yellowish, granular, and slightly wrinkled
mass, which appears to consist of small, rounded, granules of some substance. In
some individuals the epidermis is easily removed, and the underlying
substance is a pale, yellowish, granular, and slightly wrinkled
mass, which appears to consist of small, rounded, granules of some substance. In
others, however, the epidermis is easily removed, and the underlying
substance is a pale, yellowish, granular, and slightly wrinkled
mass, which appears to consist of small, rounded, granules of some substance.

Therefore it may
be inferred that the epidermis is composed of a thin layer of
dead tissue, while the underlying substance is a living, granular mass.
This is the same as the epidermis of the human skin, which
is composed of a thin layer of dead tissue, while the underlying
substance is a living, granular mass. The epidermis of the human skin
is composed of a thin layer of dead tissue, while the underlying
substance is a living, granular mass.

The concept of mass refers to all solids, liquids, and gases. It was presented in concrete form by weights of the pupils, and various things. The relation of an ounce to a pound and a pint to a quart was brought out by actually weighing and measuring and the fractional relations such as one-half, one-fourth and one-third were shown by measuring cups. Practical experience came in preparing frozen citrus concentrate which had to be mixed in proportion of one part concentrate to seven parts of water. This orange juice was prepared and served in the classroom during the warm weather. The number of oranges needed to fill an orange crate was discussed and the facts secured from a packing-house. The relationship between a pint and a quart of strawberries, and the difference in meaning of a pint and a quart of milk were discovered. Thermometers and various gauges used in packing-houses and filling stations were discussed. Why eggs are bought by the dozen, milk by the quart, and butter by the pound was presented and also the importance of weights written on cans of food and loaves of bread. The different forms of water and what was needed to change water to ice or to steam were related to the science study. Some attempt was made to show area by drawing of squares which also proved their findings in multiplication but few were able to follow beyond the simple square.

The concept of value in relationship to money and exchange, though presented last, was really the first concept

the following fall the situation was the same but
now the majority of the members of Congress had left, leaving
in the hands of the minority of the members the task of carrying
forward the proposed law from stage to stage in the Senate.
The course followed by the minority was to continue the discussion
and to insist upon changes in the bill which were desired. Some
other day or night they would come in and make suggestions
and would, however, fail to have much influence because
of the large number of men who were present and because
of the fact that they were not so well known as the others.
The result of this was that the bill was not passed until
the next day, when they were able to do so because of the
position of the party which had been most zealous
in the cause of the bill, and of those who had been
most anxious to see it become law. This party
was composed of men who were not only
zealous for the bill but also for the principles
which it represented. They were not
so numerous as the others but they were
more numerous than the others and
therefore they were able to carry
the bill through. The result of this
was that the bill was passed and became
law.

needed and used. The first procedure in dealing with each child was through the medium of money. Because he knew and recognized coins the entire program of arithmetic was introduced by having the pupils count real coins, or recognize and name them as he was able. Startling responses were made by some of the money problems. One fourteen year old boy, after strenuous attempts to count the change given him, finally said with a sigh, "Well, I do not know how much money there is on the desk, but if you put a nickel down it will make it a dollar." This statement was correct, but to him \$0.95 was unknown. Again while discussing plans for a trip down town to buy supplies, this boy was asked how much money he would give the clerk if he wanted a pencil that cost five cents and some paper that would cost ten cents. He thought about the question and then said: "I wouldn't. I would take it one at a time." Real and play money were used all year intermittently as were buying trips to the store and trips to the Post Office to buy savings stamps. All except three members of the class were working or had worked and knew something of the value of money. Many drills and games were introduced to give practice in counting money. One was when each child would be given a number of play coins and would have to count the total value and write on the board in tabulated form how many of each kind he had. For example, one might write in the spaces arranged, one dollar, three halves, four

quarters, two dimes, and three pennies and record the total sum as \$3.73. This required a long time for the calculations but was a class project that each pupil could do if given sufficient time. Also a game used with great success was the "Drive-In-Restaurant" when half of the class became waiters and the other half ordered menus from an elaborate menu written on the board. The waiter had to write out the order, total it and present the bill to the customer who after checking it for correctness gave a bill of large denomination as payment. The waiter had to make the proper change. Another interesting exercise was to write out a grocery list from advertisements in the paper with a definite amount as the limit. Trips were made to the bank and post office and a valid check and Savings Bond were examined. Trips to the City Hall, Telephone Office, Fire Station, and Red Cross Office brought out values received for taxes and values given for those in distress.

Much interest was created by each pupil trying to list each experience he had during one day in which he needed to know numbers or used numbers. Constant reference was made to the greater value received by eating lunch, costing a quarter, in the lunch room, and the habit of eating hamburgers, candy, and pop corn. It seemed to be characteristic of mentally retarded children that they satisfy their immediate desires without any thought of future need. Often pupils would spend their lunch money on candy or buy stamps

and not have lunch money when it was needed. One of the greatest improvements was seen in the appreciation for the value of money and the increased desire to save. It is quite possible that the environmental conditions surrounding these pupils had an important bearing on this lack of theirs at the beginning of the year.

The decimal was introduced only in connection with money and percentage, although some few advanced into long division of decimal numbers and enjoyed it. Much stress was placed on the importance of the decimal in writing 3 to \$3.00 or \$0.03, as well as the necessity of keeping the decimals in a straight line for addition and subtraction of sums of money. \$0.50 was interpreted as 1/2 dollar, \$0.25 as 1/4 dollar, and other common fractions were given concretely by cutting up a pie one time and pie plates at other times. The percent as 2% interest was used in connection with War Savings Bonds.

CHAPTER V

EVALUATION

Brownell¹ has pointed out that there is real danger in regarding the findings of any experiment as final, no matter how well it may have been conducted. He suggests that under changed conditions important differences in conclusions might conceivably result. Brueckner² following this same thought further states that it is highly desirable for teachers continuously to experiment with the problem of improving teaching by using new ways of enriching the learning experiences of children.

The outcomes of the methods of teaching arithmetic to mentally retarded children cannot be judged by any standard for none exists. According to Dr. Elise Martens of the U. S. Bureau of Education, very little has been done in this field and no methods are available other than some recent curriculum planning by some of the larger city schools in California and New York. Therefore, the evaluation of the effectiveness of the methods used will be considered from two different points of view: first, the evaluation as an integral element of the teaching-learning process that resulted in the educative process, and second, the evaluation of the progress made by the

1. W. A. Brownell, Readiness and the Arithmetic Curriculum, p. 495.

2. Leo J. Brueckner, Diagnostic and Remedial Arithmetic, p. 88.

individuals shown by a survey by the use of standardized tests.

Instruction and evaluation cannot be separated. As was reiterated throughout the chapter on methods, inventory and diagnostic tests were used with each change of procedure and method. Three types of evaluation were used in the daily teaching-learning procedure: written tests, informal conversation, and observation. Some description has been given of the methods of testing as inventory and diagnostic findings. Both were used as a method of evaluation but there was a distinctive difference in the use of each. After an inventory test was given the final score was computed and placed on the individual chart as an indication of rank or score to be improved. In the case of the diagnostic test, no final score was computed, but the work habits of the pupil were evaluated. The evaluation procedure of informal conversation was used in connection with the diagnostic test in allowing the pupil to describe what he was doing as he worked, as well as the repeated use of interpreting the daily happenings as meaningful arithmetic experiences. Observation was used as a factor in diagnostic testing as well as discovering to what extent the pupil was capable of meeting the problems before him.

Featherstone³ states that more frequent evaluations are

3. W. B. Featherstone, Teaching the Slow-Learner, p. 69.

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necessary for the slow learner because they need the emotional security and sense of adequacy and acceptability that comes from the assurance that what they are doing is satisfactory and that their present activities will bring them out in the end where they ought to come out. Also a further need is that they have a tendency to let tomorrow take care of itself and adopt a slip-shod method to get a partial solution and are satisfied with this.

The ideal for the evaluation of outcomes would be for the teacher to be able to say that all the pupils had mastered the fundamentals and had developed adequate concepts of quantitative relationships concerning length, mass, time and value. This, however, is not the case. Evaluation of methods presented went on continually as they were used and because these methods worked most successfully with the majority of the pupils, they were included. From the teacher point of view, there are twenty-two evaluations, for each pupil was a separate case starting at a different place and with a different "expectant quotient." From this point of view every pupil made progress factually as will be shown by the statistical tables in the second evaluation. However, far more important from the writer's standpoint is the progress made in the manifestations of evidences of pupil ability to use and apply numbers in social situations and the blossoming out of these children who for the first time have recognized themselves as persons of worth and ability.

Not only has this personality development been recognizable from the teacher's viewpoint, in the pupils' unanimous demand for "some arithmetic to do," or "some arithmetic to take home to do," but in the judgement of the school nurse, school supervisors and parents, that in some instances the entire expression of the child has changed and his countenance has become radiant because he is experiencing self-realization.

However, the writer is fully aware that these methods will not prove infallible in every case, nor that the findings of this small class in the short time of experimentation can be accepted as conclusive evidence. These methods, which in one case carried the boy with an I. Q. of 68 through the fundamentals and even at his instigation into the processes of square root, merely developed in another the ability to count any groupings of concrete objects, and the ability to count to 100 by ones, fives and tens. One fourteen year old boy who was below the first grade level at the time of admission, and who had such faulty work habits that never during the first months would he finish ten problems at one work period, now at his own wish will finish two and three sets of 100 fundamental problems with an average of 1% error.

The evaluation of the methods or the outcomes of the instructional program can be presented by charts as the results of readiness tests and standard achievement tests but in order to fully understand these a chart of the pupils used for experimentation will be presented.

Experimentation in giving these tests brought to light one definite fact. If the tests were copied on work sheets similar to those used constantly in class work, the results were considerably higher than when presented in the test sheet or booklet form, at which time it was most difficult to get some to even attempt the work. One boy who had made such outstanding progress in personality development, when given the test in booklet form, immediately reverted back to the sullen unresponsive boy who would not attempt any work and muttered to himself over and over that he could not do it. So the results of the tests are lower, on the average, because of this blocking carried over from former unpleasant experiences and associations. If the time element were mentioned or even the suggestion made that all should work as fast as possible, the results were lower than when the test was introduced merely as class work. Also the reading ability of all was very low so the results of the problem tests were unsatisfactory. However, problems were presented in the concrete and that in all probability the mentally retarded child will be called upon to solve problems as they are met verbally or realistically, not in the written form, is recognized.

about the same time as the first, though probably a few months later, and
was followed by a second wave about 1860-65. This was largely
a movement of young people from southern Europe to the United States.
Between 1860 and 1910, over 10 million immigrants were
brought into the country, mostly to work in agriculture. Many
of them were from Italy, and the new American city of New York
soon became a major center of immigrant communities.
The second great wave of immigration came after World War I,
as the demand for foreign labor increased as soldiers left
the front in Europe. This was followed by another large
immigration of Italian laborers, and these got jobs in
the construction industry, particularly in New York
and other large cities. By this time, immigration had come to include
immigrants from all over the world, and especially from Latin America, Asia, and Africa.
In addition to the economic factors that led to the
immigration, there were also political factors. In particular, the
immigration was driven by political instability in Italy, which
led to a series of revolutions and uprisings that forced many
people to leave the country. These included the Revolutions of 1848,
1860, 1864, 1867, 1870, 1873, 1875, 1876, 1877, 1878, 1879, 1880, 1881,
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CHAPTER VI

CONCLUSION

In conclusion it is the opinion of the writer that in dealing with mentally retarded children the following pertinent guiding principles must be followed:

1. The activities must be simple and so planned to be allotted to short periods of time and yet fit into a purposeful pattern.
2. The objectives and plans in each small unit must be very clear and definite.
3. The small units of work must be arranged so as to provide continuity of experience.
4. Meaningful insight must be established by the use of concrete materials and real situations.
5. Drill and more drill in a variety of presentations must be used.
6. Routine drill as such, as the multiplication tables, should never be used.
7. The outcomes and evaluations must be made from a qualitative rather than a quantitative view.
8. The method should enable the child to be successful from the outset of instruction. Materials with which he can succeed should be presented.
9. Instruction must be done individually.
10. One method should be tried systematically, then if it does not succeed, another method should be followed systematically.
11. The use of "crutches" should be allowed until the child leaves them of his own volition.

12. Materials should be presented in such a way that the child can realize he is progressing. A graph of progress or chart is good instruction aid for motivation.
13. The work should at all times be enjoyable.
14. The materials should be interesting to the child, simple enough to secure success, yet sufficiently difficult to stimulate the child to put forth the effort to learn.

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the first time I have seen a specimen of the species
from which it is described. It is a very small
shrub, with a few slender, upright branches, each
bearing a few small, narrow, linear leaves, and
a few small, yellowish flowers.

A P P E N D I X

CHART FOR EXPERIMENTAL CLASS

Standing of Class October 1, 1948

Case	Sex	Age	I. Q.		Revised Beta	School Grade	Reading Level	Arith-metic Level
			Stan-ford Binet	Wechsler Bellevue				
1	F	13-3	72	80	68	7	5	4
2	F	15-5	61	62	79	5	4	2
3	F	13-10	72	70	78	6	4	3
4	M	14-3	50	52	59	0	0	0
5	M	14	70	81	82	6	3	3
6	M	13-1	72	70	71	7	0	4
7	M	17	79	55	79	8	5	5
8	M	12	51	54	54	4	0	0
9	F	16-7	78	82	82	7	3	4
10	F	13-1	77	76	77	6	0	2
11	M	12-2	65	65	63	5	3	2
12	F	12-7	87	85	85	6	0	3
13	M	18-5	48	50	35	0	0	0
14	F	11-7	68	68	68	4	2	0
15	M	14-9	62	61	51	0	0	0
16	M	14-5	71	68	70	8	5	4
17	M	16	60	60	62	6	3	3
18	F	16-1	72	70	62	0	2	0
19	M	15-3	65	65	65	8	5	5
20	M	13-10	62	73	58	7	4	4
21	M	14-2	60	55	53	6	0	1
22	M	16-9	36	41	35	0	0	0

Achievement Test Results made in April, 1949

Case	Sex	Age	METROPOLITAN					BRUECKNER				
			Read-ing Level	Arith-metic Level	Funda-men-tals	Prob-lems	Aver-age	Funda-men-tals	Prob-lems	Aver-age		
1	F	13-3	5	4	6 ¹	5 ⁵	5 ⁸	4 ⁴	5 ⁴	4 ⁹		
2	F	15-5	4	2	4	3 ²	3 ⁶	3 ⁸	3 ²	3 ⁵		
3	F	13-10	4	3	4 ⁶	5 ²	4 ⁹	3 ²	3 ⁸	3 ⁵		
4	M	14-3	0	0	2 ⁸	0	1 ⁴	2	0	1		
5	M	14	3	3	3 ⁵	3	3 ^{2.5}	3 ⁶	3 ⁴	3 ⁵		
6	M	13-1	0	4	5 ³	3 ⁹	4 ⁶	4 ⁹	3 ⁶	4 ^{2.5}		
7	M	17	5	5	5	5 ¹	5 ^{0.5}	5 ⁸	5 ²	5 ⁵		
8	M	12	0	0	3 ⁴	2 ⁵	2 ^{9.5}	3 ²	2	2 ⁶		
9	F	16-7	3	4	5 ³	3 ⁷	4 ⁵	4 ⁴	3 ⁶	4		
10	F	13	0	2	4 ⁶	3 ⁸	4 ²	3 ¹	2 ⁷	2 ⁹		
11	M	12	3	2	3 ⁹	3 ⁷	3 ⁸	3 ⁴	3 ²	3 ³		
12	F	12-7	0	3	4 ³	3 ⁸	4 ^{0.5}	4 ³	3 ⁷	4		
13	M	18-5	0	0	2	0	1	2 ¹	0	1 ^{0.5}		
14	F	11-7	2	0	2 ³	0	1 ^{1.5}	2 ⁴	0	1 ²		
15	M	14-9	0	0	3 ¹	2 ⁵	2 ⁸	3	2 ⁴	2 ⁷		
16	M	14-5	5	4	6 ²	4 ⁹	5 ^{5.5}	4 ⁶	4 ⁸	4 ⁷		
17	M	16	3	3	4 ⁵	3 ⁹	4 ²	3 ¹	3 ⁵	3 ³		
18	F	16-1	2	0	3 ²	1	2 ¹	3	0	1 ⁵		
19	M	15-3	5	5	5 ⁵	4 ⁹	5 ²	5 ⁸	5 ²	5 ⁵		
20	M	13-10	4	4	5	5	5	4 ⁶	4 ⁴	4 ⁵		
21	M	14-2	0	1	4	2	3	3 ⁶	2 ²	2 ⁹		
22	M	16-9	0	0	0	0	0	0	0	0		

Metropolitan Achievement Tests, Primary Form III A Revised
 Metropolitan Achievement Tests, Intermediate Partial A
 Unit Scales of Attainment Division 2, Form A, developed by
 L. J. Brueckner and M. J. Van Wagenen.

